

**B. Sc. Chemistry**  
**VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT**  
**Syllabus effective from June, 2023 For**  
**B. Sc. Semester- I**  
**Multidisciplinary Subject**  
**Total credit: 02 (Theory)**  
**Total Hrs: Theory: 30**

Course Code		Title of the Course	<b>Green and Environmental Chemistry</b>
Total Credits of the Course	<b>2</b>	Hours per Week	<b>2 hr.</b>

<b>Course Outcome:</b> By the end of the course, students will be able to understand	
1.	Basic principles of green chemistry, about the principle and concept of ecosystem and their functioning
2.	Awareness and sense of responsibilities towards environment and apply knowledge to solve the issues related to Environmental pollution

**Unit – 1: Green Chemistry**

**15 hours**

Basic introduction of green chemistry, Definition of green chemistry, Importance and goals of green chemistry, Green solvents.

The twelve principles of Green Chemistry:

Detailed discussion of all the 12 principles of green chemistry, their examples and their application in industries and our daily life.

**Unit – 2: Environmental Pollution**

**15 hours**

Definition, classification, causes and effects of: Air Pollution, Water pollution, Soil pollution, Noise pollution, Radiation Pollution.

Climate Change and Global warming: Cause and Effects, Acid Rain, Ozone-Layer depletion;

Water quality parameters and standards; pH, suspended solids, Hardness of water, measurement of TDS

Effect of pollution on living systems.

### Recommended Books/References:

- *V. K. Ahluwalia, M. R. Kidwai, New Trends in Green Chemistry, Anamalaya Publishers (2005).*
- *R. Sanghi and M.M. Srivastava, Green Chemistry-Environment Friendly Alternatives, Narosa Publishing House, New Delhi 2009.*
- *K. R. Desai; Green Chemistry, Himalaya Publishing House , New Delhi*
- *P. T. Anastas, and J. K. Warner, Green Chemistry- Theory and Practical, Oxford University Press (1998).*
- *S. Matlack, Introduction to Green Chemistry, Marcel Dekker (2001).*
- *Environmental Chemistry by B.K. Sharma & H. Kaur, Goel Publishing House.*
- *Environmental Chemistry by A. K De, New Age International Publishers.*
- *A Test Book of Environmental Chemistry & Pollution Control by S. S. Dara, S. Chand and Co.*
- *Environmental Chemistry by Samir K. Banerjee, Prentice Hall of India Pvt. Ltd. New Delhi.*

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**B. Sc. Semester- I**  
**Multidisciplinary Subject**  
**Total credit: 02 (Practical)**  
**Total Hrs:60**

Course Code		Title of the Course	<b>Green and Environmental Chemistry Practical</b>
Total Credits of the Course	2	Hours per Week	4 hr.

<b>Course Outcome:</b> By the end of the course, students will be able to	
1.	Perform practicals based on the use of green chemistry principle and processes in laboratory reactions
2.	Perform the Instrumental analytical techniques or water analysis

**(Minimum 6 practicals, to be performed)**

1. Acetylation of primary amines by using vinegar.
2. Preparation of nanoparticles by green synthesis methods (using leaves, barks etc.).
3. Base catalyzed Aldol condensation
4. Diels-Alder reaction in aqueous medium.
5. Preparation of biodiesel from vegetable/ waste cooking oil.
6. Determination hardness of water in different samples (tap water, rain water, bore-well water, sea water etc.).
7. Determination temporary hardness, permanent hardness and total hardness of water in tap-water.
8. Measurement of TDS in water samples.
9. Measurement of pH in soil samples.
10. Determination of % of heavy metals in industry water.

**Reference book:**

- *Sharma, R.K.; Sidhwani, I.T. & Chaudhari, M.K. I.K. Green Chemistry Experiment: A monograph International Publishing House Pvt Ltd. New Delhi. Bangalore CISBN 978-93-81141-55-7 (2013).*
- *Vogels Textbook of Quantitative Chemical Analysis, 6th Eds, (2006).*